/D/O/L/D/

Operating Instructions

from program version: 310M0

DMP 96 E - *Z* - 2P/3P
DMP 96 E - *Y* - 2P/3P
DMP 48 ES - *Z* - 2P/3P
DMP 48 ES - *Y* - 2P/3P
DMP 48 EW - *Z* - 2P/3P
DMP 48 EW - *Y* - 2P/3P

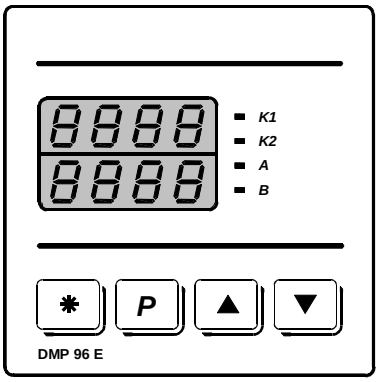
with configurable input

Z: **Sensor Pt 100, Thermocouple, Standard signal**
Y: **NTC UUA 2.25 K, NTC UUA 10 K, PTC KTY 10.6, Potentiometer 1kΩ...100kΩ**

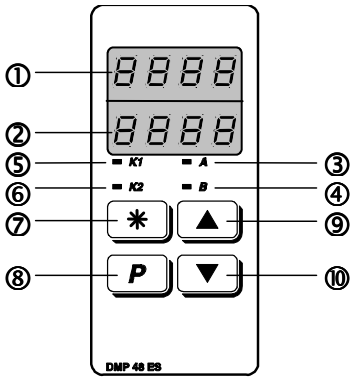
as Single channel controller

2P: **Two point controller, Continuous controller**
3P: **Three-point controller, Three-point stepping controller**

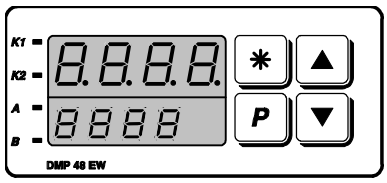
DMP 96 E



DMP 48 ES



DMP 48 EW



Operating and display elements

①	Actual value display in operating mode, parameter display in input mode
②	Nominal value display in operating mode, parameter value in input mode
③	LED is lit if logic output is active, LED flashes if logic output is locked
④	LED is lit if logic input is activated
⑤	LED is lit if output K 1 is active, LED flashes if output K 1 is locked
⑥	LED is lit if output K 2 is active, LED flashes if output K 2 is locked
⑦	Switching key controller / manual actuator
⑧	Jump to input level and operating level, confirmation key, keying through the parameters on one level
⑨	Increasing code value, parameter value
⑩	Reducing code value, parameter value

The display elements K 1, K 2 and A in locked condition

Limit contact with locking, break contact — LED flashing (tact ratio approx. 1/5 LED on / LED OFF)
Limit contact with locking, make contact — LED flashing (tact ratio approx. 5/1 LED on / LED OFF)

Read and observe these operating instructions before commissioning the unit into operation. Read and observe the added pages " Safety notes and Installation notes ".

Configuration and programming of the unit

Parameter setting at the various levels

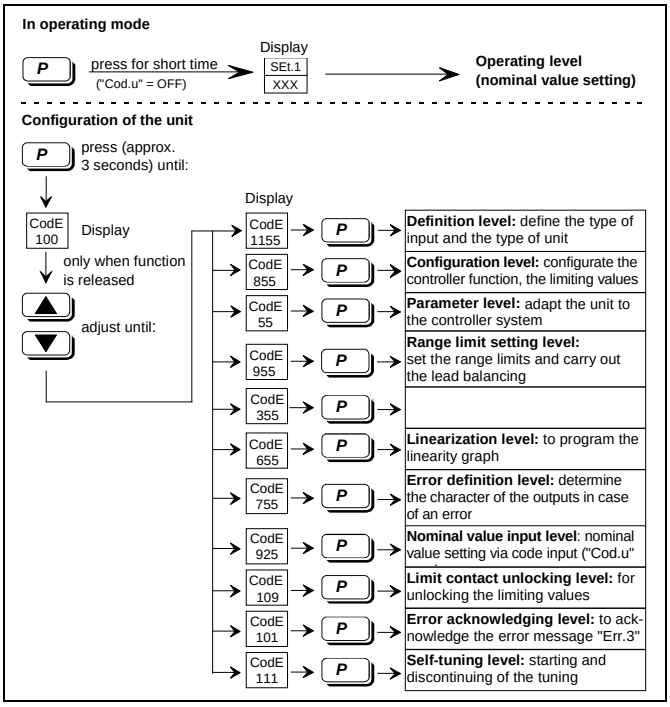
▲	current value: after 10 steps after 10 steps	**+1** **+10** **+100**
▼	current value: after 10 steps after 10 steps	**-1** **-10** **-100**
P	enter	
✱	restart timeout (extend) during input	

After accepting the last parameter, jump back into operating mode.

If within approx. 30 seconds (timeout) no key is activated, automatic jump back to operating mode. The possibly altered value is not accepted. With the star key the timeout can be restarted (extended).

If an incorrect code number is accepted for jumping to a level, then **"FALS"** appears on the display. You have to wait for timeout and for the jump back to operating mode before you can input a new code number (approx. 30 seconds). After this a new code input can be carried out.

The operating structure



Parameters of the definition level (code 1155)	**Display / Works setting**
With standard signal input and potentiometer input the range limits must be set at the range limit level (code 955).	"dEFn"
Type of input 01: Sensor Pt 100 — 08: Current 0...20 mA 02: Fe-CuNi Type L — 09: Current 4...20 mA 03: Fe-CuNi Type J — 10: Voltage 0...50 mV DC 04: NiCr-Ni Type K — 20: Sensor NTC UUA 10 K 05: PtRh-Pt Type S — 21: Sensor NTC UUA 2.25 K 06: Voltage 0...10 V DC — 22: Sensor PTC KTY 10.6 07: Voltage 2...10 V DC — 23: Potentiometer 1kΩ...100kΩ	"inPt" / 01 (unit of version Z) 20 (unit of version Y)
Unit type 01: Two point controller with 2 limit contacts: controller output — output K 1 limit contact 1 — output K 2 limit contact 2 — logic output actual value, setpoint value, fixed value — analogue output 02: Two point controller with 2 limit contacts: controller output — logic output limit contact 1 — output K 1 limit contact 2 — output K 2 actual value, setpoint value, fixed value — analogue output 03: Continuous PID-controller / Two point controller with hysteresis setting (for SSR) and 3 limit contacts: controller output — analogue output limit contact 1 — output K 1 limit contact 2 — output K 2 limit contact 3 — logic output 04: Three-point controller with 1 limit contact: controller output — output K 1 heating controller output — output K 2 cooling limit contact 1 — logic output actual value, setpoint value, fixed value — analogue output 05: Three-point controller with 1 limit contact: controller output — output K 1 heating controller output — logic output cooling limit contact 1 — output K 2 actual value, setpoint value, fixed value — analogue output 06: Three-point controller with 1 limit contact: controller output — logic output heating controller output — output K 1 cooling limit contact 1 — output K 2 actual value, setpoint value, fixed value — analogue output 07: Three-point controller with 2 limit contacts: controller output — analogue output heating controller output — output K 1 cooling limit contact 1 — output K 2 limit contact 2 — logic output 08: Three-point stepping controller with PD character and 1 limit contact: controller output — K 1 heating resp. valve "open" controller output — K 2 cooling resp. valve "close" limit contact 1 — logic output actual value, setpoint value, fixed value — analogue output	"tYPE" / 01

Parameters of the configuration level (Code 855)	**Display / Works setting**
The parameters appears independent of the unit type "tYPE" (code 1155). After changing configuration or re-configuration the controller character and the switching function of the limit contacts, the appropriate parameters must be set at the parameter level (code 55) or be adapted to the controlled system.	"CFG"
Two point controller / Continuous controller **Configuration of the controller output** **Output K 1** **Logic output for triggering a SSR** **Analogue output** 01: Two point controller cooling with hysteresis setting to higher temperature 02: Two point controller cooling with PID character 03: Two point controller heating with hysteresis setting to lower temperature 04: Two point controller heating with PID character The analogue output can, configured as cooling or heating controller with hysteresis setting (parameter "Ctr.A" = 01 or 03), also be used as logic output for triggering a SSR.	"Ctr.1" / 04 "Ctr.L" / 04 "Ctr.A" / 04
Three point controller - configuration of the controller outputs **Output K 1** **Output K 2** **Logic output** **Analogue output** 01: Three point controller with hysteresis setting 02: Three point controller with PID character The analogue output can, configured as controller output with hysteresis setting (parameter "Ctp.A" = 01), also be used as logic output for triggering a SSR.	"CtP.1" / 02 "CtP.2" / 02 "CtP.L" / 02 "CtP.A" / 02

Parameters of the configuration level (Code 855)	**Display / Works setting**
Three-point stepping controller - configuration of the controller outputs Outputs K 1 and K 2 are assigned to the controller function. The configuration of the outputs is not necessary.	-
Configuration of the limit contacts, (only for outputs without controller function) **Output K 1** **Output K 2** **Logic output** **Function: Limit contact absolute** 00, 07: output no function 01: make contact referenced to increasing temperature 04: break contact referenced to increasing temperature 08: as function 01 with locking 11: as function 04 with locking **Function: Limit contact following to the nominal value** 00, 07: output no function 02: make contact referenced to increasing temperature 05: break contact referenced to increasing temperature 09: as function 02 with locking 12: as function 05 with locking **Function: Limiting comparator** 00, 07: output no function 03: limiting comparator in the approval range closed 06: limiting comparator in the approval range open 10: as function 03 with locking 13: as function 06 with locking **Please note:** 08...13: Unlocking possibilities: with logic input (with parameter setting "Con.L" = 04) or via level code 109. With configuration "Li.1", "Li.2", "Li.L" = 08...13 (Limit contact with locking) and "Con.L" ≠ 04 the appropriate limit contact remains locked until power switch off.	"Li.1" / 00 "Li.2" / 00 "Li.L" / 00
Automatic function (controller / manual actuator); only with function Two point controller / Continuous controller with PID character ("tYPE" = 01, 02, 03; "Ctr.1", "Ctr.L", "Ctr.A" = 02 or 04) on: controller OFF: manual actuator switching between controller / manual actuator via ✱ (and reverse)	"Auto" / on

Parameters of the parameter level (Code 55)	**Display / Works setting**
The parameters appears independent of the configured function in code level 855).	"PArA"
K 1 Controller output with hysteresis **Two point controller ("tYPE" = 01; "Ctr.1" = 01, 03)** **Three point controller ("tYPE" = 04, 05, 06, 07; "CtP.1" = 01)** hysteresis	"HY.1" / 1.0℃ / 10 Digit
K 1 Controller output with PID character **Three point controller ("tYPE" = 04, 05, 06, 07; "CtP.1" = 02)** death band	"db.1" / 0.0℃ / 0 Digit
K 1 Controller output with PID character **Two point controller("tYPE" = 01; "Ctr.1" = 02, 04)** **Three point controller ("tYPE" = 04, 05, 06, 07; "CtP.1" = 02)** proportional band integral time (setting 0 = portion 0) derivative time (setting 0 = portion 0) cycle time Set the PID return parameter according to your experiences or your measurements, or start a self-tuning.	"Pb.1" / 5.0℃ "ti.1" / 250 s "td.1" / 50 s "CY.1" / 30 s
K 1 and K 2 Controller outputs **Three-point stepping controller ("tYPE" = 08)** proportional band integral time (setting 0 = portion 0) derivative time (setting 0 = portion 0) cycle time motor running time Set the PID return parameter according to your experiences or your measurements, or start a self-tuning.	"Pb.1" / 5.0℃ "ti.1" / 250 s "td.1" / 50 s "CY.1" / 30 s "run" / 60 s
K 1 Limit contact absolute ("tYPE" = 02, 03; "Li.1" = 01, 04, 08, 11) limit absolute hysteresis	"LA.1" / 0℃ "HY.1"/1.0℃
K 1 Limit contact following to the nominal value ("tYPE" = 02, 03; "Li.1" = 02, 05, 09, 12) limit relative hysteresis	"Lr.1" / 0℃ "HY.1"/1.0℃
K 1 Limiting comparator ("tYPE" = 02, 03; "Li.1" = 03, 06, 10, 13) symmetric spreading (hysteresis 0.5℃ or 5 Digit fix)	"bd.1" / 5.0℃/50 Dig.
K 2 Controller output with hysteresis **Three point controller ("tYPE" = 04; "CtP.2" = 01)** hysteresis	"HY.2" / 1.0℃/10 Digit

Parameters of the parameter level (Code 55)	**Display / Works setting**
K 2 Controller output with PID character **Three point controller ("tYPE" = 04; "CtP.2" = 01)** death band	"db.2" / 0.0℃ / 0 Digit
K 2 Controller output with PID character **Three point controller ("tYPE" = 04; "CtP.2" = 02)** proportional band integral time (setting 0 = portion 0) derivative time (setting 0 = portion 0) cycle time	 "Pb.2" / 5.0℃ "ti.2" / 250 s "td.2" / 50 s "CY.2" / 30 s
K 2 Limit contact absolute **("tYPE" = 01, 02, 03, 05, 06, 07; "Li.2" = 01, 04, 08, 11)** limit absolute hysteresis	 "LA.2" / 0℃ "HY.2"/1.0℃
K 2 Limit contact following to the nominal value **("tYPE" = 01, 02, 03, 05, 06, 07; "Li.2" = 02, 05, 09, 12)** limit relative hysteresis	 "Lr.2" / 0℃ "HY.2"/1.0℃
K 2 Limiting comparator **("tYPE" = 01, 02, 03, 05, 06, 07; "Li.2" = 03, 06, 10, 13)** symmetric spreading (hysteresis 0.5℃ or 5 Digit fix)	"bd.2" / 5.0℃ / 50 Digit
Logic output as controller output with hysteresis **Two point controller ("tYPE" = 02; "Ctr.L" = 01, 03)** **Three point controller ("tYPE" = 05, 06; "CtP.L" = 01);** hysteresis	"HY.L" / 1.0℃ / 10 Digit
Logic output as controller output with PID character **Three point controller ("tYPE" = 05, 06; "CtP.L" = 01);** death band	"db.L" / 0.0℃/0 Digit
Logic output as controller output with PID character **Two point controller ("tYPE" = 02; "Ctr" = 02, 04)** **Three point controller ("tYPE" = 05, 06; "CtP.L" = 02)** proportional band integral time (setting 0 = portion 0) derivative time (setting 0 = portion 0) cycle time	 "Pb.L"/5.0℃ "ti.L" / 250 s "td.L" / 50 s "CY.L" / 30 s
Logic output as Limit contact absolute **("tYPE" = 01, 03, 04, 07, 08; "Li.L" = 01, 04, 08, 11)** limit absolute hysteresis	 "LA.L" / 0℃ "HY.L"/1.0℃
Logic output as Limit contact following to the nominal value **("tYPE" = 01, 03, 04, 07, 08; "Li.L" = 02, 05, 09, 12)** limit relative hysteresis	 "Lr.L" / 0℃ "HY.L"/1.0℃
Logic output as Limiting comparator **("tYPE" = 01, 03, 04, 07, 08; "Li.L" = 03, 06, 10, 13)** symmetric spreading (hysteresis 0.5℃ or 5 Digit fix))	"bd.L" / 5.0℃ / 50 Digit
Analogue output with hysteresis **Two point controller ("tYPE" = 03; "Ctr.A" = 01, 03)** **Three point controller ("tYPE" = 07; "CtP.A" = 01);** hysteresis	"HY.A" / 1.0℃ / 10 Digit
Analogue output **Three point controller ("tYPE" = 07; "CtP.A" = 01);** death band	"db.A" / 0.0℃/0 Digit
Analogue output with PID character **Continuous controller ("tYPE" = 03; "Ctr.A" = 02, 04)** **Three point controller ("tYPE" = 07; "CtP.A" = 02)** proportional band integral time (setting 0 = portion 0) derivative time (setting 0 = portion 0)	 "Pb.A"/5.0℃ "ti.A" / 250 s "td.A" / 50 s

Parameters of the range limit setting level (Code 955)	**Display / Works setting**
After any change of configuration or re-configuration of the nominal value range, the nominal value settings must be monitored at the operating level or at the nominal value setting level (Code 925) and adapted to the nominal value range. The parameter settings are dependant on the input definitions.	"rAnG"
Lead balancing or zero point correction	"Corr" / 0℃
Evaluation of the internal temperature compensation on: evaluation of the internal temperature compensation OFF: no evaluation of the internal temperature compensation	"Co.Co" / on
Display range start ("inPt" = 06...10; 23)	"inLo"/0 Digit
Display range end ("inPt" = 06...10; 23) configuration "inLo" > "inhi" with inverted input signal Note: actual value < -999 Digit: "-UFL" is displayed actual value > 9999 Digit: "OFL" is displayed	"inhi" / 9999 Digit
Configuration analogue output (output size according to order) 01: 0..20 mA; 0...1 V DC; 0...2 V DC; 0...5 V DC; 0...10 V DC 02: 4..20 mA; 0,2..1 V DC; 0,4..2 V DC; 1..5 V DC; 2..10 V DC 03: 4..20 mA; 0,2..1 V DC; 0,4..2 V DC; 1..5 V DC; 2..10 V DC Extension to function 02: the output value will become lower as the minimum size of output (according to order) 0...20 mA, 0...1 V DC, 0...2 V DC, 0...5 V DC, 0...10 V DC).	"con.A" / 01
analogue output 01: output analogues to the actual value 02: output analogues to the setpoint value 03: fixed value of current or fixed value of voltage	"SEL.A" / 01
Inverse operation of the continuous controller on: inverse operation of the continuous controller OFF: direct operation of the continuous controller	"in.A" / OFF

Parameters of the range limit setting level (Code 955)	**Display / Works setting**
Regulation ratio in % with fixed value, **(fixed value of current or fixed value of voltage)** 0...100% refers to size of output 0..20 mA, 0..1 V DC, 0..2 V DC, 0...5 V DC, 0...10 V DC (according to order)	"StA.A" / 0%
Output value of the last regulation ratio after stopped regulation (only with Two point controller / Continuous controller, "TYPE" = 03) on: output value of the regulation ratio = 0% OFF: output value of the last regulation ratio	"StP.A" / on
Configuration Logic input (the contact must be opened or closed for a minimum of 0.5 seconds, so that the required function occurs). 00: logic input no function 01: switching nominal value burden / regulation ratio contact open nominal value 1 / regulation ratio 1 contact closed nominal value 2 / regulation ratio 2 02: stop function contact closed controller output deactivated and lower display dark 03: programming disabled contact closed programming enabled contact closed programming disabled 04: unlocking limit contacts ("Li.X" = 08...13)	"Con.L" / 00
Nominal value setting on: nominal value setting via nominal value input level (Code 925) OFF: nominal value setting via operating level	"Cod.u" / OFF
Nominal value range start	"rALo" / 0℃
Nominal value range end With configuration "rALo" = "rAhi" nominal value setting at the operating level or at the nominal value setting level is not possible. With configuration "rAhi" < "rALo" switching between the set values at the operating level or at the nominal value setting level is possible with the buttons ▲ or ▼.	"rAhi" / 600℃ / 9999 Digit
Range start output analogues to the actual value or to the setpoint value ("tYPE" = 01, 02, 04, 05, 06, 08) starting value for 0 mA / 0 V resp. 4 mA / 0,2 V / 0,4 V / 1 V / 2 V DC	"AnLo" / 0℃ / 0 Digit
Range end output analogues to the actual value or to the setpoint value ("tYPE" = 01, 02, 04, 05, 06, 08) range end for 20 mA DC / 1 V DC / 2 V DC / 5 V DC / 10 V DC	"Anhi" / 100℃ / 1000 Digit
Display resolution (depend on type of input "inPt") Pt 100, Thermocouple, NTC, PTC ("inPt" = 01...05; 20...22): 00: resolution 1℃ 01: resolution 0.1℃ Standard signal, Potentiometer ("inPt" = 06...10; 23): 00: resolution 1 02: resolution 0.01 01: resolution 0.1 03: resolution 0.001	"dECP" / 00
Linearization on: using the programmable linearity graph OFF: using the internal linearity graph	"Lin.F" / OFF
Linearization range start = 0%: -999.9...9999 Digit	"LLo"/0 Digit
Linearization range end = 100%: -999.9...9999 Digit	"Lhi"/1000 D.

Parameters of the linearization level (Code 655)		
X-value of pair 1	A.01	"A.01" / -
Y-value of pair 1	b.01	"b.01" / -
X-value of pair 2	A.02	"A.02" / -
Y-value of pair 2	b.02	"b.02" / -
X-value of the last pair n: X-value of the last pair (n = maximum 32)	A.n	"A.XX" / -
Y-value of the last pair n: Y-value of the last pair (n = maximum 32)	b.n	"b.XX" / -
Identification the end of the linearization (A.n+1), enter		"A.XX" input: -1
Please note!	**"A.XX":**	**X-value of the linearization function. Fixing the several ranges of the linearity graph. "A.XX" - values must be set increased: "A.01" < "A.02" < ... < "A.n" !**
	"b.XX":	**Y- value of the linearization function.**

Parameters of the error definition level (Code 755)	
Incorrect error allocation at the outputs can, in the event of an error, cause substantial damage to persons and property!	"FAUL"
Error allocation output K 1, K 2, logic output on: output active in event of an error OFF: output inactive in event of an error Locked limit contacts are unlocked in the event of an error!	"FLt.1"/OFF "FLt.2"/OFF "FLt.L"/OFF
Error allocation analogue output; output signal in event of an error in %, refer to size of output 0..20 mA, 0...1 V DC, 0...2 V DC, 0...5 V DC, 0...10 V DC (according to order)	"FLt.A" / 0.0 %

The nominal value input level (Code 925)	
Setting the nominal value is only possible with code input, if parameter "Cod.u" is on at the range limit level.	
Nominal value 1	"SEt.1"/0℃
Nominal value 2 (appears only with configuration "Con.L" = 01)	"SEt.2"/0℃

Nominal value setting via operating level	Display / Works setting
Nominal value 1	"SEt.1"/0℃
Nominal value 2 (appears only with configuration "Con.L" = 01)	"SEt.2"/0℃

Regulation ratios	
Manual actuator only with function Two point controller / Continuous controller ("TYPE = 01, 02, 03). The unit can, configured as PID controller, also be used as manual actuator. If the parameters "Ctr.1" , "Ctr.L" or "Ctr.A" are set to 02 or 04 and "Auto" is set to "OFF"), then switching from controller operation to manual actuator operation (and reverse) is possible with button ✱ .	
Regulation ratio 1 (appears only with configuration "Ctr.1" , "Ctr.L" or "Ctr.A" = 02 or 04 and "Auto" = OFF)	"-Y-1" / 0%
Regulation ratio 2 (appears only with configuration "Ctr.1" , "Ctr.L" or "Ctr.A" = 02 or 04; "Auto" = OFF and "Con.L" = 01)	"-Y-2" / 0%

The limit contact unlocking level (Code 109)
At this level the limit contacts can be unlocked by setting code 109.

The error acknowledging level (Code 101)
At this level the error message "Err.3" can be acknowledged by setting code 101. **Please note!** *"Error messages"* : Err.3.

Adapting the PID controller automatically to the controlled system - the self-tuning

- set nominal value and tune the controller
- let controller stabilise and operate the plant
- evaluate controller efficiency and correct controller parameters if necessary.

The self-tuning works according to the setting rules of Ziegler-Nichols. With controlled systems of a higher order and with controlled systems with greater dead times and delay times, it does not always lead to optimal results. The controller parameters must be corrected only with greater actual value fluctuations after self-tuning. The tuning on the heating side is only possible, if heat is removed from the system, so that the temperature falls again below the nominal value. The tuning on the cooling side is only possible, if the system develops its own heat, so that the temperature after cooling rises above the nominal value by itself.

To correct the controller parameters yourself, you will need in-depth knowledge of regulating methods!

Lifetime of relays independent of cycle time!

The self-tuning level (code 111)	Display
Start up	Opti / on
Discontinuation	Opti / OFF

During self-tuning extreme conditions can occur in the plant. The self-tuning procedure must be monitored continuously. After self-tuning the parameter "CY.X" at the parameter level must be checked. Lifetime of relays independent of cycle time!

Inspection of the tuning

The inspection of the tuning is important for the correct setting of the process. The inspection of the settings can be carried out by observation of the controller procedure or by recording the controller curve with a suitable recording apparatus.

Lifetime of the relay

Period per switching cycle	Period, after which the 10^6 switching cycles are reached (8 hour/day operation with 500 VA load)
2 minutes	approx. 11.4 years
60 seconds	approx. 5.7 years
30 seconds	approx. 2.8 years
This table is not valid for SSR relays (solid state relays)	

Error messages

Display	Error
Err.1	falling below range, exceeding range, sensor faulty (interruption or short circuit), thermocouple: sensor lead (balancing lead) cross-polarity standard signal: cross-polarity
Err.2	sensor Pt 100: error tertiary lead thermocouple: ambient temperature of the unit > 70°C or < -10°C
Err.3 ("Err.3" can be acknowledged by setting code 101 or by switching the unit OFF- ON)	Forced correction of parameters in dependence of ranges. After any change of configuration or re-configuration of the type of input, the unit type, the display range and the nominal value range the parameters in dependence of ranges will automatically adapted to the new configuration in the background. With error message "Err.3" all relevant parameters must be checked and adapted to the new configuration.
Please note!	**Units with potentiometer input:** **No monitoring of sensor fault or lead fault!**

Technical data

Input analogue

Sensor Pt 100 two-wire connection, three-wire connection -100...600℃
sensor break protection, short circuit protection, circuit balancing or calibration of safety barriers maximum 50 Ω each lead with two-wire connection, automatic wire resistance compensation maximum 50 Ω each lead with three-wire connection
sensor current constant 1 mA DC
calibration accuracy ≤ 0.15 % of measuring range extent
linearity error ≤ 0.1% of measuring range extent
Thermocouple Fe-CuNi Type L 0...850℃; NiCr-Ni Type K 0...1200℃
Fe-CuNi Type J 0...850℃; PtRh-Pt Type S 0...1700° C
sensor break protection and cross-polarity protection, internal temperature compensation, error recognition with cold junction temperature of the unit > 70℃ or < -10℃
influence of the lead resistance ≤ 2µV/Ω
calibration accuracy ≤ 0.15 % of measuring range extent
linearity error ≤ 0.15% of measuring range extent
temperature drift character (without internal temperature compensation) ≤ 80 ppm/℃
Standard signal (cross-polarity protection, zero point correction) -999...9999 units
0...20 mA DC, 4...20 mA DC, 0...50 mV DC, 0...10 V DC, 2...10 V DC
input resistance current Ri = 121 Ω
input resistance voltage Ri > 100 kΩ
calibration accuracy ≤ 0.15% of measuring range extent
linearity error ≤ 0.1% of measuring range extent
temperature drift character ≤ 100 ppm/℃
Sensor NTC UUA 2.25 K, two-wire connection -25...100℃
Sensor NTC UUA 10 K, two-wire connection 0...150℃
Sensor PTC KTY 10.6, two-wire connection -50...125℃
sensor break protection, short circuit protection, zero point correction
maximum power loss approx. 1,6 mW
calibration accuracy: UUA 2,25 K ≤ 0.15% refer to range -10...100℃
UUA 10 K ≤ 0.15% refer to range 15...150℃
KTY 10.6 ≤ 0.15% refer to range -50...125℃
linearity error: UUA 2,25 K ≤ 0.15% refer to range -10...100℃
UUA 10 K ≤ 0.15% refer to range 15...150℃
KTY 10.6 ≤ 0.15% refer to range -50...125℃
temperature drift character ≤ 100 ppm/℃
Potentiometer 1kΩ...100kΩ (with zero point correction) -999...9999 units
input resistance voltage Ri > 100 kΩ
calibration accuracy ≤ 0.15% of measuring range extent
linearity error ≤ 0.1% of measuring range extent
temperature drift character ≤ 100 ppm/℃
Input digital external, potential free contact, contact voltage approx. 5 V DC
Common data measuring cycle 500 ms
resolution ≥ 12 Bit

Outputs

2 Relay outputs K 1 and K 2, make contact, with integrate spark quenching (4.7nF)
contact load ≤ 250 V AC, ≤ 8 A resistive load, type 500 VA with 10^6 switching cycles
or **Logic outputs** for SSR instead of K 1 or K 2 (typically 0/10 V DC, maximum 10 mA)
1 Logic output for SSR (typically 0/10 V DC, maximum 10 mA)
1 Analogue output (option), output size according to order
resolution 10 Bit
current configurable (idle proof), load ≤ 400 Ω 0..20 mA, 4...20 mA
voltage configurable (short circuit proof), maximum load current 10 mA
0...1 V DC, 0.2...1 V DC; 0 ... 5 V DC, 1 ... 5 V DC;
0...2 V DC, 0.4...2 V DC; 0...10 V DC, 2...10 V DC.

Energy supply

Operating voltage 230 V AC ± 10%, 48...62 Hz
Rate of power input ≤ 4.5 VA
Special voltages: 115 V AC, 48 V AC, 24 V AC, 24 V DC, other special voltages ask the producer , protection: the unit has a built-in thermal protection
Climatic requirements according to 75% relative humidity without dewing
working temperature range 0...+50℃
storage temperature range -30...+70℃
Electric safety according to DIN EN 61 010
excess voltage category III
degree of contamination 2 according to DIN EN 60 335
protection class II
isolation group C according to DIN VDE 0110 b
type of protection DIN EN 60 529
front panel (optionally: IP 64 with the proper mounting and a suitable sealing ring) IP 50
housing IP 30
connections (screwed socket strips nominal cross section 2.5 mm^2) IP 20

Housing, mounting

Pull-out housing for mounting control panel as per DIN 43 700 with a B fastener as per DIN 43 835 (M 4 screw clamp); Material: PPO, glass-fiber reinforced (Noryl GFN2SE1), self-extinguishing, non-dripping, fire protection class UL 94 V1
Front panel dimensions: DMP 96 E 96 x 96 mm
DMP 48 ES / DMP 48 EW 96 x 48 mm
Control panel cutout: DMP 96 E $92^{+0.8}$ x $92^{+0.8}$ mm
DMP 48 ES / DMP 48 EW $92^{+0.8}$ x $45^{+0.6}$ mm
Recess depth 101 mm

CE - conformity

Generic emission EN 50 011
IGEneric immunity EN 61 000-6-2
Harmonic current emissions EN 61 000-3-2
Flicker EN 61 000-3-3
IEC **EU - guidelines applying to**EU - electromagnetic compatibility (89/336/EWG)
EU - low tension (73/23/EWG)

Subject to technical and functional change.

/D/O/L/D/

Safety notes and Installation notes

DMP 96 E - Z - 2P/3P
DMP 96 E - Y - 2P/3P
DMP 48 ES - Z - 2P/3P
DMP 48 ES - Y - 2P/3P
DMP 48 EW - Z - 2P/3P
DMP 48 EW - Y - 2P/3P

Read and observe these safety notes and installation notes before commissioning the unit into operation. Read and observe the operating instructions (added to the unit).

Safety notes

Please read these notes on safety attentively and note the listed points! They concern the safety of persons and of the equipment!

The unit is concepted mainly as a temperature controller. However, it can also be used for other, slow changing physical dimensions, where two measurements per second are sufficient for accurate function. The logical cohesion of the temperature controller must then be transferred to the appropriate dimensions. Substantial damage to persons and property can be caused through improper use, application, installation, configuration or operation within a plant!

Important! The unit must not be used as a safety device, it serves as process controller, process control as well as process monitoring!

The unit must not be installed in the EX-area! If everything with process dimensions from the EX-area and the unit is installed outside the EX-area, all supply lines of the unit, which lead into the EX-area, must be directed over safety barriers!

The satisfactory and safe operation of the unit presupposes, that the unit is transported, stored and installed with due care and that it is properly fitted.

This unit must be installed, configured, commissioned and parameters have been setting by qualified persons only, who are familiar with the installation, commissioning and servicing or comparative units, as well as with the installation, for which the unit is used and must have knowledge of measuring control and regulating methods.

The operating personnel of the plant, in which the unit is to be used, must be instructed in its operation by qualified persons.

Please note

- the contents of these manual, especially the notes of installation, commissioning and adaptation of the unit to the controlling system,
- the safety regulations affixed to the unit,
- the respective safety regulations for the installation and the operation of electric plant,
- keep these manual for later applications.

The regulations mentioned in these manual are valid for all EC countries. For application in a country outside the EC, the appropriate national regulations must be observed.

This unit has been manufactured and tested according to DIN EN 61010 part 1 "protection measures for electronic measuring units", and has left our factory in a safety and operational technical satisfactory condition.

Mounting location of the unit

The mounting location must be free from vibrations. The unit must not be mounted in the proximity of motors, transformers, valves and other inductive loads. The ambient temperature at the mounting location can be 0...50℃ with a relative humidity of ≤ 75% (without dewing). Aggressive gases and vapours can quickly destroy the unit. Any fitting position is suitable.

Fitting of the unit

- Insert the unit from the front side into the control panel cutout
- Suspending the fastener in the lateral nipple of the grip by the back of the control panel
- Thereby the flat sides of the fastener must border of the housing
- The fastener must be tighten against the back of the control panel symmetrical with a screwdriver
- Any fitting position is suitable.

Please note! Don't resort to force !

Installation notes

Please read the installation notes attentively and observe all listed points when installing the unit. If these notes are ignored, function interferences can occur, the required EMV guide lines are not complied with, and CE-conformity is no longer fulfilled.

Ensure before connecting and commissioning of the unit, that the operating voltage and the required operating voltage ratio of the unit comply with those at the location (see rating plate and technical data). If necessary, carry out the appropriate measures.

Ensure that the control voltage and load voltage at the location is switched off, and secured against switch on for the period of installing the unit. The electrical connections are to be carried out in accordance with the connection diagram and the appropriate national regulations. Use multi core cable end at wiring with flexible jumper wire. Arrange the supply lines to the unit in such a way, that they are free from tensile load under all conditions and that they are not in any possible danger of being cut-off or crushed.

Shielded cables must be used for sensor leads, for thermocouples shielded compensatory leads. The sensor leads must be arranged spatially separated from the load leads and control leads (power lines).

Compensatory leads for thermocouples must not be intermediately clamped with normal clamps, as otherwise additional thermocouples are created, which could falsify the measuring result!

Connect the shield of the sensor lead with the unit as close as possible to the fitting board and lay the lead with a minimum of 1.5 mm^2 cross-section from this point to the earthed collecting bar.

Inductive loads, such as contactors, valves, motors, transformers etc., switched from the unit, as well as inductive loads installed in the same control cabinet or in the same plant, must be suppressed with unit-specific interference suppressers!!

The load circuits and control circuits of the unit relays must be fused against overload.

These manual do not contain all notes on the regulations, standards etc., which must be observed and followed when working with the unit in connection with plants. These regulations, standards etc. must be compiled and observed by the operator of the unit, application-specific.

Commissioning and adaptation of the unit

The unit is supplied pre-configured to an application, so by switching on some function is present. This pre-configuration is suitable for the given requirements in only a few cases, it means, the unit must be adapted to the controller system of the plant, in which it is to be used.

Switch on

Check the wiring again carefully! Incorrect wiring of the unit can lead to serious damage to the unit and the plant!
Ensure that the load voltage of the plant is switched off at the initial switch on of the unit, because the unit is not yet adapted to the plant and can therefore possibly cause error functions.

Now switch on the operating voltage of the unit.

Lead balancing or zero point correction

When operating the unit with a resistance thermometer with the two wire method, the lead resistance, as well as a safety barrier, is noticeable through a constant temperature measuring error. This temperature measuring error can be corrected on the range limit setting level (code 955) with the parameter "Corr". Furthermore, the temperature difference between the temperature of the measuring point, the temperature sensors, the unit and the temperature of the process can be equalised with this parameter.

Temperature differences between measuring point and process should be kept to a minimum by selecting the measuring point! This substantially improves the controller result! When the temperature sensor is fitted improperly, overheating or under cooling can occur, and therefore, damage to personnel or material!

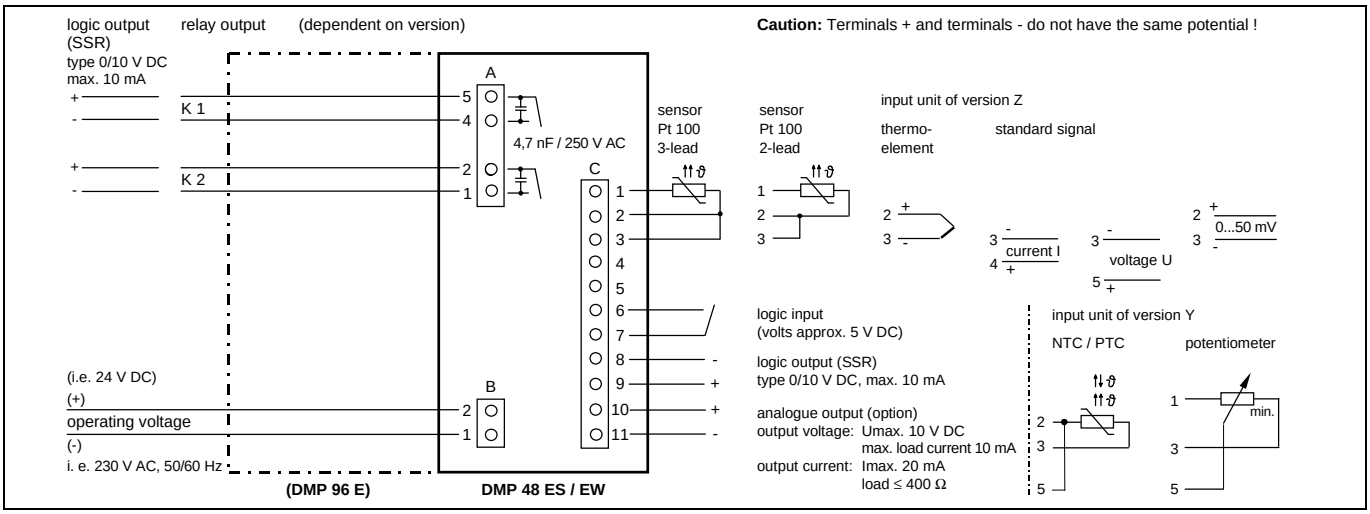
Setting the operating nominal value

Depending on configuration of the parameter "Cod.u" at the range limit setting level (code 955) you can set your operating nominal value at the operating level or at the nominal value input level (code 925).

Please note

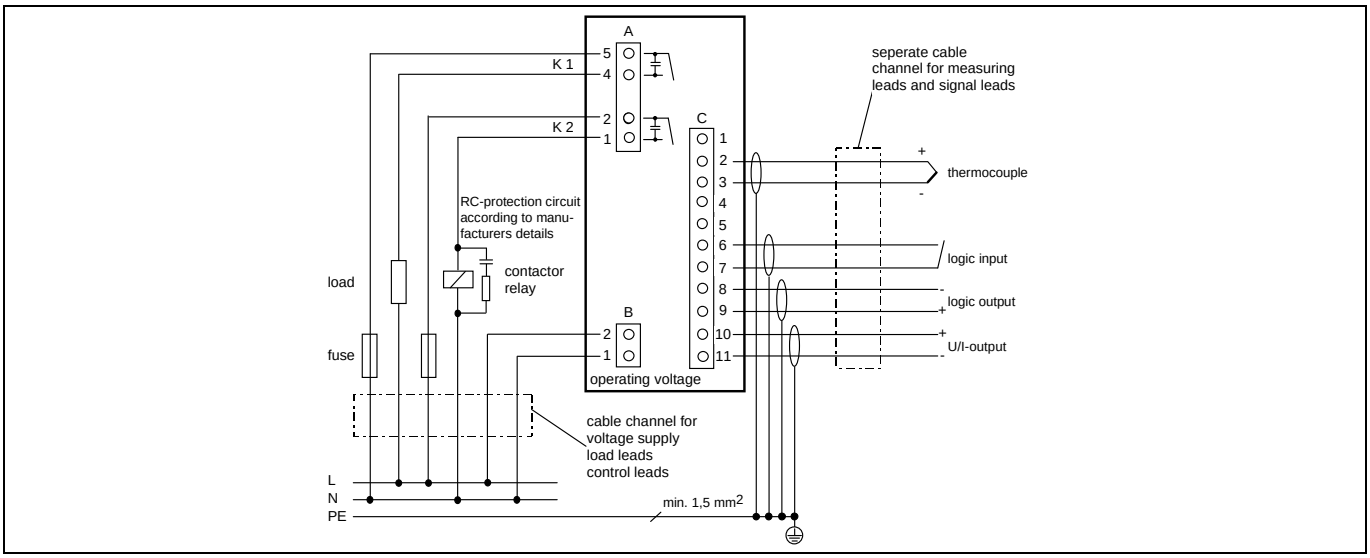
If the nominal value is taken out of adjustment during the operation of the plant, then the plant must first build-up to the new value! It means, there will be some instability in the regulation, until the actual value has set itself to the new nominal value. During operation as PID controller with relay output, it can be some time after switch on before the controller relay responds and the unit is seen to carry out its task, due to the PID typical time character!

Terminal connection diagram (in dependence on version)

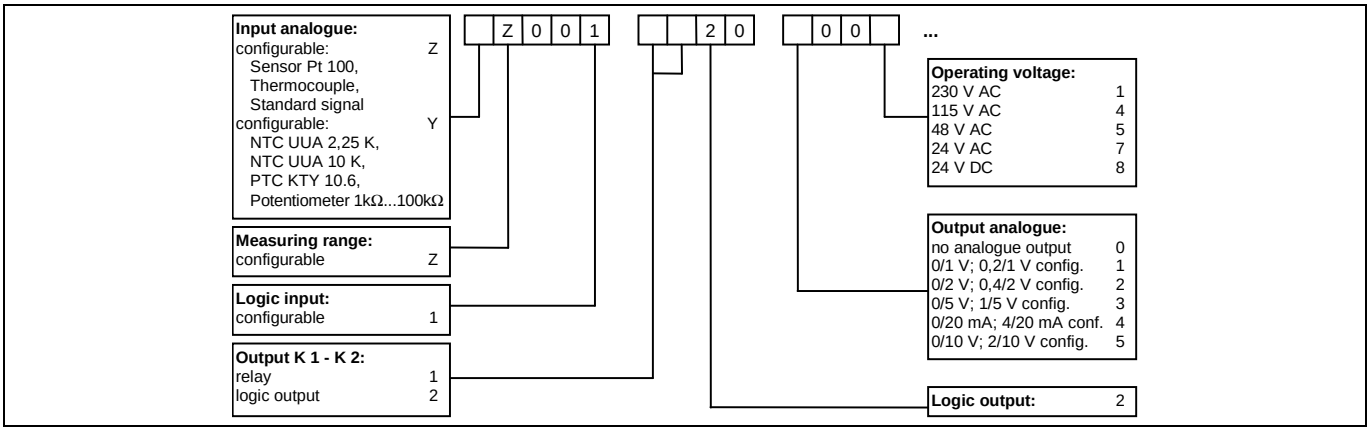


Wiring diagram (Wiring example)

To enable effective discharge of interferences the shielding of the sensor leads and signal leads must be connected to earth at the side of the unit.



Order code (identification of the unit)



Rating plate

If making technical enquiries the following details are important:

unit type	*unit type*
article number	order code
program version	*program version*
works number	*works number*
	operating voltage
	contact load
	protection class
	protection mode
	working temp. range